CLAIMS

This listing of claims will replace the listings of claims in the application.

1. (Currently Amended) An x-ray tube comprising at least one x-ray target substrate, wherein said x-ray target substrate comprises a molybdenum-based nanocomposite, said molybdenum-based nanocomposite comprising:

a) a metallic matrix comprising molybdenum; and

b) a plurality of nanoparticles, said nanoparticles (a) having at least one dimension in a range from about 10 nanometers to about 500 nanometers and (b) being dispersed throughout said metallic matrix, wherein said plurality of nanoparticles comprises from about 2 volume percent to about 20 volume percent of said molybdenum-based nanocomposite;

wherein each of said plurality of nanoparticles comprises at least one of an inorganic oxide, an inorganic carbide, an inorganic boride, an inorganic oxycarbide, an inorganic oxynitride, an inorganic silicide, an inorganic aluminide, and combinations thereof.

2. (Original) The x-ray tube according to Claim 1, wherein said metallic matrix comprises at least one of elemental molybdenum and a molybdenum-based alloy, and combinations thereof.

3. (Canceled)

4. (Previously Presented) The x-ray tube according to Claim 1, wherein said inorganic oxide is one of a rare earth oxide, yttria, alumina, zirconia, hafnia, titania, calcia, magnesia, and combinations thereof.

5. (Original) The x-ray tube according to Claim 4, wherein said inorganic oxide is yttria.

6. (Previously Presented) The x-ray tube according to Claim 1, wherein said inorganic carbide is a carbide of hafnium, tantalum, molybdenum, zirconium, niobium, chromium, titanium, tungsten, and combinations thereof.

7. (Canceled)

8. (Presently amended) The x-ray tube according to Claim [[7]] 1, wherein said at least one dimension is in a range from about 10 nm to about 30 nm.

9. (Original) The x-ray tube according to Claim 1, wherein said plurality of nanoparticles comprises from about 4 volume percent to about 10 volume percent of said molybdenum-based nanocomposite.

10. (Original) The x-ray tube according to Claim 1, wherein said molybdenum-based nanocomposite has a strength in a range from about 400 MPa to about 1200 MPa.

12. (Canceled)

13. (Original) The x-ray tube according to Claim 1, wherein each of said plurality of nanoparticles is substantially spherical.

14. (Original) The x-ray tube according to Claim 1, wherein each of said plurality of nanoparticles has a substantially ellipsoidal shape.

15. (Previously Presented) A nanocomposite, said nanocomposite comprising:

a) a molybdenum-based metallic matrix; and

b) a plurality of nanoparticles, said nanoparticles (a) having at least one dimension in a range from about 10 nanometers to about 500 nanometers and (b) being dispersed throughout said molybdenum-based metallic matrix, wherein said plurality of nanoparticles comprises from about 2 volume percent to about 20 volume percent of said nanocomposite;

wherein each of said plurality of nanoparticles comprises at least one of an inorganic oxide, an inorganic carbide, an inorganic boride, an inorganic oxycarbide, an inorganic oxynitride, an inorganic silicide, an inorganic aluminide, and combinations thereof.

16. (Original) The nanocomposite according to Claim 15, wherein said molybdenum-based metallic matrix comprises at least one of elemental molybdenum and a molybdenum-based alloy, and combinations thereof.

17. (Canceled)

18. (Previously Presented) The nanocomposite according to Claim 15, wherein said inorganic oxide is one of a rare earth oxide, yttria, alumina, zirconia, hafnia, titania, calcia, magnesia, and combinations thereof.

19. (Original) The nanocomposite according to Claim 18, wherein said inorganic oxide is yttria.

20. (Previously Presented) The nanocomposite according to Claim 15, wherein said inorganic carbide is a carbide of hafnium, tantalum, molybdenum, zirconium, niobium, chromium, titanium, tungsten, and combinations thereof.

21. (Canceled)

22. (Presently Amended) The nanocomposite according to Claim [[21]] 15, wherein said at least one dimension is in a range from about 10 nm to about 30 nm.

23. (Original) The nanocomposite according to Claim 15, wherein said plurality of nanoparticles comprises from about 4 volume percent to about 10 volume percent of said nanocomposite.

24. (Original) The nanocomposite according to Claim 15, wherein said nanocomposite has a strength in a range from about 400 MPa to about 1200 MPa.

26. (Canceled)

27. (Original) The nanocomposite according to Claim 15, wherein each of said plurality of nanoparticles is substantially spherical.

28. (Original) The nanocomposite according to Claim 15, wherein each of said plurality of nanoparticles has a substantially ellipsoidal shape.

29. (Original) The nanocomposite according to Claim 15, wherein said nanocomposite is formed by generating a nanocomposite powder by one of mechanical milling and cryogenic milling, consolidating said nanocomposite powder to make a green body, thermomechanically processing said green body to form said nanocomposite.

30. (Original) The nanocomposite according to Claim 29, wherein said cryogenic milling process is one of a non-reactive milling process and a reactive cryogenic milling process.

31. (Original) The nanocomposite according to Claim 29, wherein said thermomechanical processing comprises at least one of extrusion, forging, rolling, and swaging of said nanocomposite.

32. (Original) The nanocomposite according to Claim 29, wherein said nanocomposite is subjected to severe plastic deformation, where said severe plastic deformation comprises equiaxial channel angular processing of said nanocomposite.

33. (Original) The nanocomposite according to Claim 32, wherein said severe plastic deformation comprises at least one of torsion extrusion and twist extrusion of said nanocomposite.

34. (Original) The nanocomposite according to Claim 33, wherein said nanocomposite forms a portion of an x-ray target.

35-74 (Canceled)